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GEOGRAPHIC INTELLIGENCE REPORT

ROAD NET ALONG THE KRASNOVODSK - TASHKENT - ALMA-ATA RAIL ROUTE



CIA/RR-GR-39

15 February 1954

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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APPENDIX 2 - THE KRASNOVODSK - TASHKENT - ALMA-ATA RAIL ROUTE

1. Introduction

This study describes and analyzes the road net and the physical features affecting trafficability along the rail route extending from Krasnovodsk to Alma-Ata. The rail route consists of the Turkestan Trunkline from Krasnovodsk to Tashkent, the Tashkent - Arys¹ line of the Turkmen Railroad System, and the Arys² to Alma-Ata section of the Turkmen Trunkline. The area covered by this study forms a long corridor approximately 2,170 kilometers (1,350 miles) long and about 100 kilometers (60 miles) wide -- 50 kilometers to the north and south of the railroad line. This corridor passes through the Soviet Turkmen, Uzbek and Kazakh republics, and also includes a strip along the borders of the Tadzhik and Kirgiz republics. The area includes both the road net adjacent to the railroad line as well as significant roads located short distances away. Diverse terrain, vegetation, hydrographic, and climatic features within the corridor influence the density and surface conditions of the roads as well as the possibilities for cross-country movement of both pedestrians and vehicles. (See Maps A, B, C - Roads and Trafficability along the Krasnovodsk - Tashkent - Alma-Ata Rail Route, which are located on the orientation map Soviet Central Asia.) After a general discussion on the classification of roads in the corridor, the route is divided into four major sections: Krasnovodsk - Dashkhan, Dashkhan - Fergan, Fergan - Gulistan, and Gulistan - Alma-Ata. In each section the following

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and density of highways, improved and unimproved roads, trails, and caravan routes are discussed in detail. When available, information on surfaces, maintenance, traffic, and military or economic significance of individual roads is included.

II. Classification of Roads

Most roads in the area are a part of a larger road system which was developed over a period of many years to meet the economic and military needs of Soviet Central Asia. Adverse natural conditions have kept road construction to a minimum and many of the existing roads are in very poor condition. The official classification and maintenance of roads varies according to the standards of the road administrations of the various republics, and is also governed by the amount of traffic handled.

The highways and improved dirt roads which carry inter-regional traffic are comparatively few. Those that do exist are of military or commercial importance, either serving as approach routes or handling trade with Iran, Afghanistan, and China. Many roads radiate from such large urban centers as Bishkek, Tashkent, Dushanbe, or Alma-Ata, and from the railroad stations along the route. With the exception of a few stretches of highway and improved dirt road, they are of the unimproved dirt type and frequently disappear in a maze of by-roads and trails. Unimproved roads and trails form the greater part of the road net. These are strictly of local importance and are generally of seasonal character. In some parts of the Turkmen and Uzbek republics the number

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of roads and trails is extremely small. In these areas, however, travel is facilitated by surface conditions that permit cross-country movement of pack animals and vehicles.

Highways are generally of good surface and are adequately maintained. They include the military roads such as (a) the Great Uzbek Highway (Bol'shoy Uzbekskiy Trakt) which leads from Tashkent through Samarkand to Termez on the Afghan border, (b) the highway from Samarkand via Stalinabad to Kirovabad on the Afghan border, (c) and the highways from Kizyl-Arvat and Leninabad to the Iranian frontier towns of Kizyl-Atrah and Gavan. Most of these towns have road surfaces of cobblestones or rolled gravel about 12.5 centimeters (5 inches) thick. In the vicinity of some of the larger urban centers, stretches of modern construction -- asphalt, asphalt-concrete, or block -- can be found. Other highways usually consist of rolled gravel and differ little from improved dirt roads.

Improved dirt roads are generally surfaced with crushed rock, gravel, and sand. Construction methods differ along various sections of the route. In well-drained areas and in areas where the soil is firm, little more is done than minimum grading and spreading of crushed rock and sand to a depth of approximately 5 centimeters (2 inches). This surface is generally rolled.

In areas of unstable soils or where ground water is a problem, a base of coarse crushed rock, slag, or rubble is rolled into the road bed. The road is then surfaced with a mixture of coarse sand and rock.

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or crushed rock alone, from 10 to 30 centimeters (4 to 12 inches) in thickness. Most of the roadways range from 9 to 11 meters (30 to 36 feet) in width. Examples of improved dirt road are the stretches Dzhirbel - Kizil-Arvat - Archman, Ashkhabad - Tedschen - Bukhara, Tashkent - Chirchik, and Dushanbe - Begovat - Fergana.

Unimproved dirt roads consist of natural earth with no prepared base. The surface is of simple construction. The road bed is prepared by loosening the hard ground, grading, levelling and sometimes consolidating by rolling. Frequently unimproved dirt roads are only tracks made by vehicles repeatedly travelling between certain points. The untreated surfaces of the unimproved roads are often seriously affected by climatic conditions. They are best during the dry season or when frozen. During rainy periods they become extremely muddy and are almost impassable. Wheeled motor vehicles must struggle for every mile of travel. In the portions of the route along mountain slopes snow cover may make the months from November through April extremely unfavorable for travel.

Unimproved dirt roads vary in character in different parts of the corridor. The roads in the level lowland areas cross expanses of loam and sandy soils and are usable for the greater part of the year. Their relatively firm surfaces permit wheeled vehicles to attain speeds of 40 to 48 kilometers (25 to 30 miles) per hour. Roads in such areas are unusually wide. This is particularly true along portions of the Krasnovodsk - Dushak - Bukhara sector of the rail route. Dust storms during which wind velocities often reach 110 kilometers (70 miles) per

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hour are frequent hazards. At such times visibility is reduced considerably. Storms have been known to last from 1 to 3 days. During such times road markings and well locations are often undistinguishable.

Unimproved roads through oasis areas are probably the poorest roads encountered in the corridor. The poor drainage and unstable subsoils result in deeply rutted roads which become impassable mud tracks during rainy periods. In such areas the dense settlement and the demand for cultivated land severely limits the width. The Mary, Chardakan, and Buthans areas are served by such roads.

In the gently undulating portions of the piedmont and foothill areas, the roads resemble those found in the lowland. However, they usually have longer gentler grades, and sometimes cross dry ravines and washes. Trafficability, in general, is good. Where the terrain is more hilly, deep ravines and gulches make cuts and fills necessary along the roadway. Under dry conditions, the road surfaces become loose and are subject to blowing. During the wet season mud becomes a serious problem. Pack animals and animal-drawn vehicles are the common means of transport in such areas.

Natural conditions in the mountainous sections, such as the Kopet-Dag and Tien Shan, present additional road difficulties. Steep grades, numerous sharp curves and small streams, ravines, rock outcrops, and scattered loose rock are common. The roads are narrow, poorly constructed, and poorly maintained. In the valleys, however, they often become broader.

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Report of driver the reported vehicle is involved in about 25 accidents
(25 million) per hour.

Trails and paths are important throughout much of the corridor, often serving as major connections where no established roads exist. The temporary or shifting nature of many trails and paths gives rise to supply problems. Caution should be exercised in relying on available maps (both English and Soviet) for information on trails, paths, or caravan routes since many of these routes no longer exist or their alignment has changed from that indicated on the maps. According to recent information obtained from a Russian source who was engaged in road construction in Turkestan before World War II, a substantial number of the trails and paths shown on Soviet maps were taken from pre-1921 Russian maps.

In the past, numerous trails served as approaches to wells and water points used by nomadic tribes. Since the Soviet collectivization policy was adopted in 1930 the movements of the nomads have been severely curtailed and many of the trails and caravan routes have been abandoned. However, many of these abandoned routes can still be located by their firm, smooth surfaces, some of which are depressed as much as 1 meter below the level of the surrounding land. Several of the ancient caravan routes are still used to a limited extent. Among these are the routes leading from Kizyl-Suvat, Arzhman, and Davat-Yak. It should be noted that many of the "country roads" shown on Soviet maps are little better than trails or paths; however, they have been classified as such because they accommodate motor traffic to some degree.

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III. The Road Net from Krasnovodsk to Dushak

The part of the corridor between Krasnovodsk and Dushak follows a generally northwest-southeast course parallel to the northern face of the high Koyet-Dag Mountains. Through most of this distance the Turkistan trunkline traverses the narrow foreland or piedmont between the Koyet-Dag Mountains and the Kara-Kum Desert. The road net along the trunkline is relatively poor. Although maps show the railroad crossing a dense road net from west to east it consists mostly of unimproved dirt roads, caravan routes, and trails.

The density of the road net varies considerably from west to east along the line. The road net is least developed between Krasnovodsk and Kazandzhik. In a distance of approximately 270 kilometers available maps show only two comparatively long stretches of dirt road and a few unimproved dirt roads and trails. Eastward along the railroad from Kazandzhik, however, numerous unimproved dirt roads and trails, leading from the railroad to small settlements and oases to the north and south of the line, form a comparatively dense road net. The most important feet of these roads are the urban centers which are strung out at intervals along the railroad (Figure 1). Within the cities are both paved and dirt roads (Figure 2). Especially predominant in the area north of the railroad are trails which, along with a few caravan routes, generally extend for great distances into the Kara-Kum Desert. Comparatively few unimproved dirt roads and no improved roads lead north from the Krasnovodsk - Dushak sector of the corridor, but many unimproved dirt roads, a few

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Figure 1. An oasis railroad station. Balcharden on the Kopet-Dag plateau.

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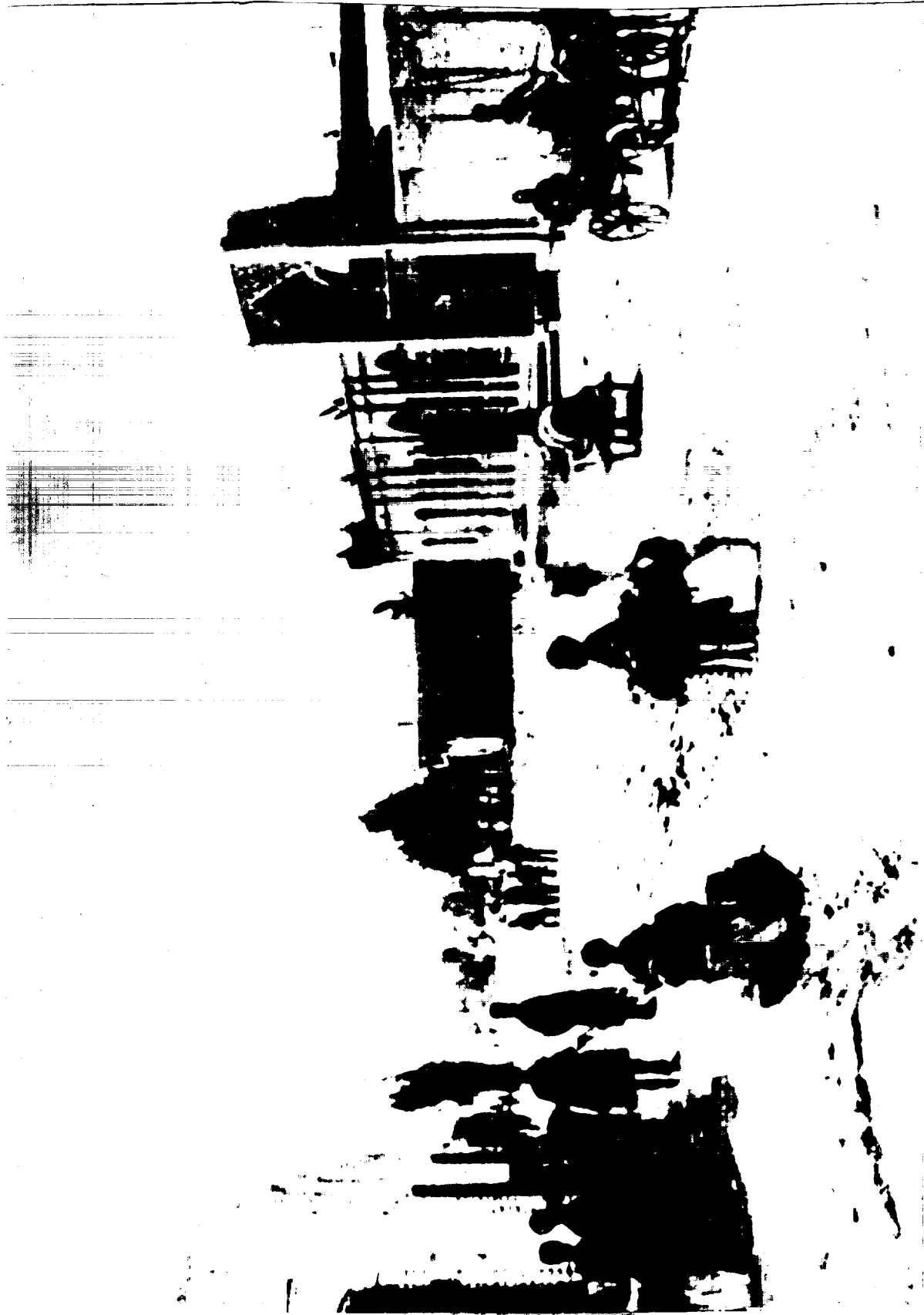


Figure 2. City street in old section of Isfahan.

Improved dirt roads, and three highways extend to the south. The highways originate at Kizyl-Arvat and Ashkhabad, the most important road centers in this sector. Road travel parallel to the rail line is made possible by an improved dirt road and by a relatively short stretch of highway between Dushak and Dushak, a distance of about 500 kilometers.

Climatic conditions have a very important bearing on both road travel and cross-country movement. Temperature extremes, spring sand conditions, blinding dust storms, and the lack of precipitation are factors which can seriously restrict movement.

Krasnovodsk, a major Caspian port and oil-refining center, is the focus of several roads and trails entering from the west, north, and east. It is situated on the northern shore of the Gulf of Krasnovodsk and at the southern foot of the Krasnovodsk Plateau. The plateau, usually trafficable by all types of vehicles except during the spring rainy period, has an elevation of from 100 to 300 meters.

The trails and all roads but one leading from Krasnovodsk are of local significance only. Most of the local roads extend north along the coast or across the plateau, or head northeast across the northern part of the Kara-Kum Desert to cities on the lower Amu-Dar'ya River. Of these the most important is the improved dirt road which leads west from Krasnovodsk. At a point near Kizyl the road turns northward and follows the Caspian seacoast to the Kara-Bogaz-Gol. No information is available concerning the width or adequacy of the road, but improvements probably

* All elevations, unless otherwise indicated, are in meters above mean sea level.

can be of little use in providing for the navigation of a small craft
river, perhaps 1 to 6 meters in width. During the short winter periods
characteristic of the region some parts of the road may be impassable to
motorized traffic. Although the road provides comparatively rapid
access by motor vehicles to points along the coast, the economic or
military significance is not readily apparent.

A road, which may be sufficiently well built to be considered usable
in all weather, now links the railroad from Krasnovodsk to Uzun, a port
and petroleum storage area located about 2 kilometers east of Krasnovodsk.
According to a recent report, a bus service has been opened between
Krasnovodsk and Uzun. There is no available information concerning the
width or other characteristics of this road. It may continue as a narrow
trail beyond Uzun.

Krasnovodsk is connected by an unimproved dirt road to Kasi-Tuzin,
a settlement on the railroad approximately 40 kilometers to the east.
Rather than following the narrow coastal plain at the foot of the plateau,
the road parallels the railroad at distances from 4 to 10 kilometers to
the north on top of the plateau.

According to a recent Soviet publication, a road is planned to
connect Nakhichevan (approximately 42°17'N - 49°45'E) at the southwestern
end of the proposed Main Turkish Canal, to Krasnovodsk. The exact
alignment of the proposed road is unknown, but it may follow the pro-
jected route of the canal - west-northwestward from Tashkent, along the
the ancient bed of the Amu-Darya (the Oxus) across the Karakum Desert
to the arid regions of the Caspian plain. If the projected road follows

the road route, it may intersect the railroad near Kazandzhik and then continue westward along the railroad to Krasnovodsk.

Between Kara-Tengir and Dzhabel no known roads parallel or intersect the railroad line, but recent Soviet maps indicate a trail leading north from the railroad at Belak, a settlement located approximately 30 kilometers east of Kara-Tengir. South of the railroad along this stretch is the Shor Balkhashkiy, a former arm of the Gulf of Krasnovodsk, and now a salt marsh depression, subject to periodic non-tidal inundation. It can probably be traversed by persons and animals during summer when a dry crust forms over its surface, but even in summer it is doubtful that a motor vehicle could cross it. The dust problem, which is serious throughout the area, is especially bad in these salt depressions.

From Dzhabel to Kazandzhik the railroad is paralleled by an improved dirt road. This road runs along the northern side of the railroad for most of its extent to Kazandzhik, except for the 12-kilometer stretch west of Akcha-Kuyus, where it runs south of the railroad. Between Dzhabel and Kazandzhik, a rail distance of about 125 kilometers, the route follows a course along the southwestern piedmont of the Great Balkhan Mountains, crosses a stretch of low marshy land, and then continues along the piedmont at the northern edge of the Little Balkhan Mountains.

Two unimproved dirt roads and three trails branch from the line between Dzhabel and Kazandzhik. The first road runs north from Dzhabel along the eastern side of the Great Balkhan Mountains, a difficult to traverse mountain highland with elevations in excess of 1,500 meters.

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the second leads south from Balla-Ishen across a plain where salt swamps and sandy deserts are common. A trail extends north from the railroad at Balla-Ishen and follows a rugged course across the Great Balkhans, and another trail also leads northward across a sandy desert from a point about midway between Pereval and Akcha-Kuyua. A third trail leads south from Akcha-Kuyua across a piedmont to the base of the western end of the Kopet-Dag Mountains. These unimproved dirt roads and trails are part of the local road net and have little military or economic significance. However, according to some reports a road of economic importance may follow the spur railroad which runs from Nebit-Dag to the oil fields near Vyska, approximately 26 kilometers to the southwest. This spur crosses a marshy poorly-drained lowland, the Shor Kel'kor. Like the Shor Balkhanskiy to the northwest, it is traversible on foot only during the dry season when a hard crust forms on its surface. The Shor Kel'kor lies opposite the mouth of the Uzboy, the dry former course of the Amu-Dar'ya River. East of the Great Balkhan Mountains the Uzboy is a depression about 120 meters wide and 70 meters deep, and contains many salt-pans. Some sources report the existence of a caravan route between Nebit-Dag and the Iranian border.

From Kazanizhik to Dushak, a distance of about 480 kilometers, the railroad (Figure 3) follows a course along the narrow piedmont between the northern face of the high and rugged Kopet-Dag Mountains and the sandy wastes of the Kara-Kum Desert. The piedmont terrain is flat to hilly and is covered with a hard-packed fine sandy soil. It is generally

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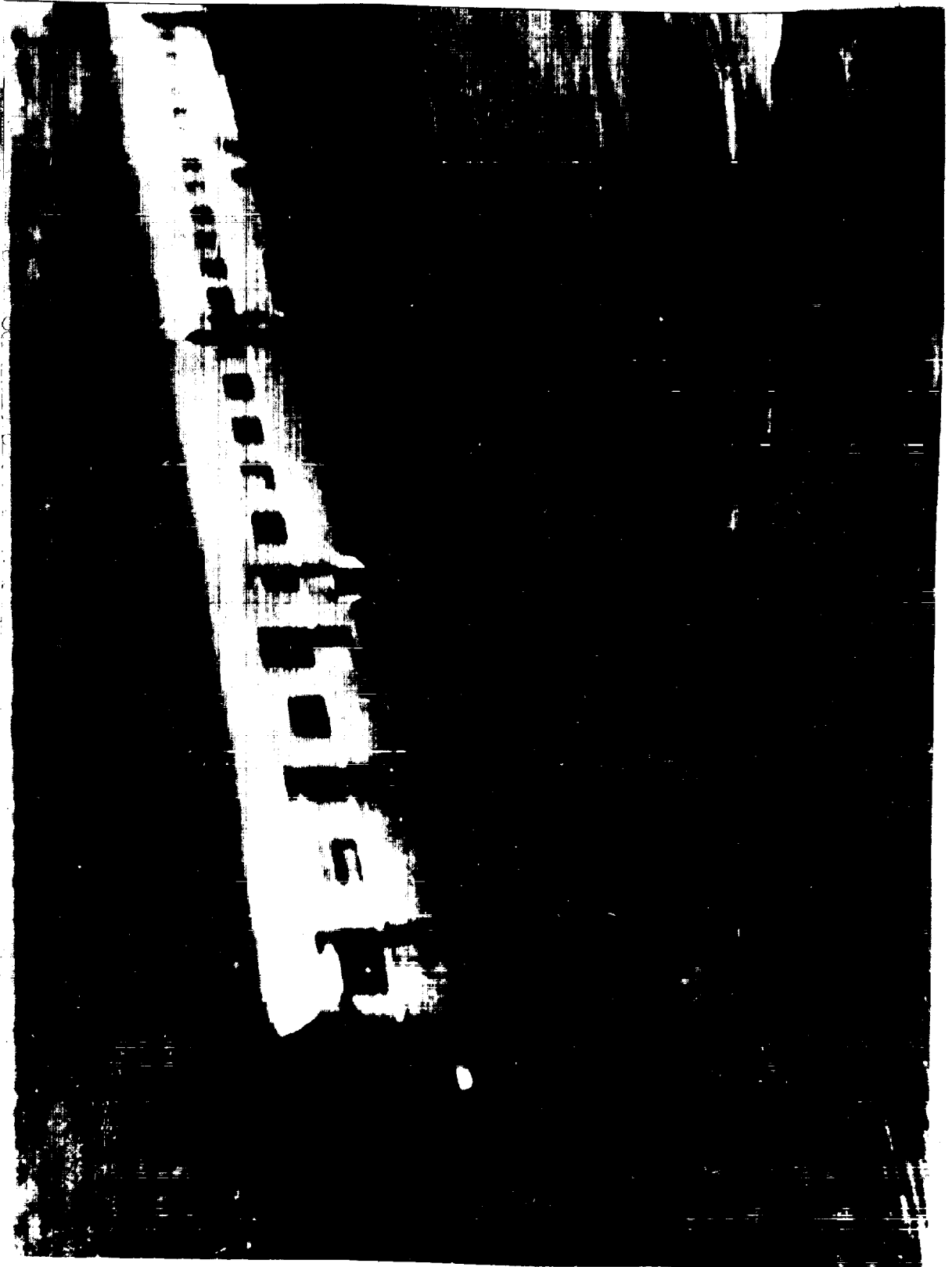


Figure 3. Passenger boat on Transoceanic - Ashland Island. Said boat in foreground.

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favorable for cross-country movement either on foot or by vehicle, although both are hindered in places by stream channels, loose sand, boulders, and occasional marshes. The streams, often dry most of the year, come to life during spring thaws and after heavy showers in the mountains. They usually disappear before completely crossing the piedmont. The vegetation, which consists primarily of short grasses, bushes, and low trees, does not appreciably affect cross-country movement.

A good road closely parallels the railroad the entire distance from Kazandzhit to Dushak. This road, which is classified as a highway between Archman and Ashkhabad crosses the railroad numerous times before it reaches Dushak.

Roads leading south from the railroad into the Kopet-Dag Mountains encounter very difficult terrain. Vehicles are confined to the few established roads which are necessarily winding and have steep slopes (Figure 4). Cross-country movement on foot or by animal is possible but very difficult. Heavy snows and slides often block mountain roads in winter.

Three highways lead south from the railroad. The first begins at Kizyl-Arvat, crosses the Kopet-Dag and eventually crosses into Iran after following the Atrek River for a considerable distance. Two highways branch to the south from Ashkhabad. The Ashkhabad - Gaudan - Mashhad (Mashad) Highway traverses mountainous terrain and crosses the USSR-Iran frontier at Gaudan, 42 kilometers south of Ashkhabad. The highway is probably paved with asphalt but there is no information readily

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Figure 1. Ashkhabad - Firyuza highway in the Topst-Dag Mountains.

available as to its width or other characteristics. The road is of military and economic importance and is used to export raw materials out of Iran. According to one intelligence source, traffic is heavy and consists mainly of trucks. The second highway from Ashkezar leads to Firyuz, a resort center near the Iranian border (Figure 4). According to recent information, the Firyuz highway is a three lane asphalt road in good condition. In addition to these three roads, there is a paved highway on the Iranian side of the border which terminates at Isfabad (Lyutabad), Iran, approximately 4 kilometers south of the railroad settlement of Kyuren-Kala. It is probable that a road of some type connects this highway with Kyuren-Kala.

A number of other important roads extend south. At Kazandzhik and at Iskander two unimproved dirt roads cross hilly to mountainous terrain and extend to the Iranian border. At the Uzun-Su station, located about halfway between Kazandzhik and Iskander, an improved dirt road extends to a point about 10 kilometers to the south beyond which a trail leads farther south. Radiating from Kisyl-Arvat, a locomotive and car repair center, are a series of unimproved dirt roads and a caravan route. Bami and Archman are the focal of numerous local unimproved roads and trails. At Bami there is also an improved dirt road which leads to Kara-Govok, 15 kilometers to the south. At Kalyazyar, Ashkhabad, Amana, Kyuren-Kala, Hantkha, and Arman-Baghi other unimproved dirt roads run south for short distances from the railroad. These roads are often interconnected by an irregular network of trails.

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North of the railroad the outer edge of the piedmont grades into the sandy tracts of the Kara-Kum Desert at distances of 15 to 30 kilometers from the base of the Kopet-Dag Mountains. The roads in this area, which are generally no more than trails, traverse a vast sandy plain (Figure 5) with many sand ridges, dunes, clay-floored depressions, and salt-marshes. On the open plains the sand varies in thickness from a few inches to many feet. In summer temperatures are very high, often over 100° F. The vegetation is too low and scattered to provide protection from the sun. Sand and dust storms are common, particularly in summer. Movement in this broad area to the north of the piedmont is generally possible on foot, but motor vehicles are restricted to certain established roads and trails.

The more important unimproved dirt roads lead north from Kazanishik, Ishankier, Kizyl-Arvat, Bakharden, Ashkhabad, and Kachika. The two running north from Ashkhabad are particularly worthy of mention. One leads to the sulphur mines at Sernyy Zavod (Figure 5) and Darvaan, 150 kilometers to the north. The other runs first to the east and then swings north for approximately 80 kilometers to the Karry-Cherlya well.

Three important caravan routes extend across the Kara-Kum Desert (Figure 6). Two originate at Kizyl-Arvat, the third from Archman. All three eventually lead to the cities along the lower Amu-Dar'ya River.

A maze of trails which usually lead to wells or join the dirt roads and caravan routes, extends for some distance out into the desert.

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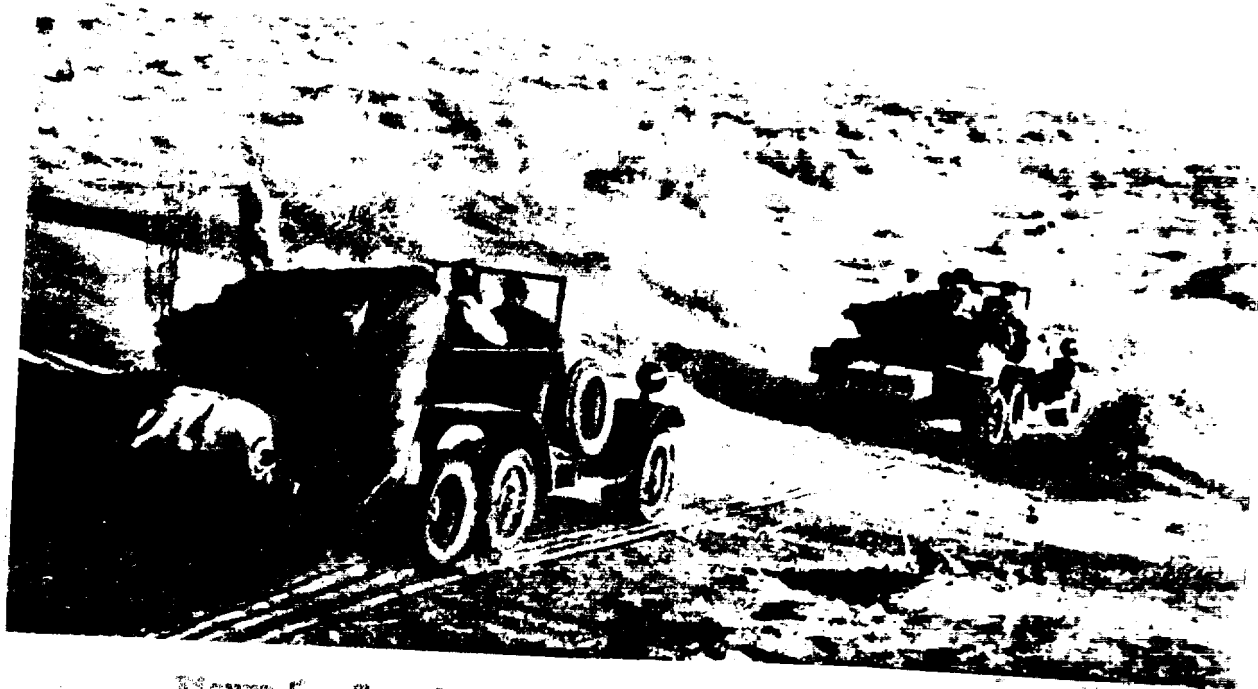


Figure 5. Travel on an unimproved dirt road in the Kara-Kum desert between Ashkhabad and Serryj Zavod.



Figure 6. A slow moving camel train on a caravan route crossing the Kara-Kum Desert.

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IV. The Road Net from Dushak to Kagan

The Dushak - Kagan section of the corridor follows a generally west-east course to Bayram-Ali and a northeast course from Bayram-Ali to Kagan. The road network along this 535-kilometer distance of the Turkestan Trunkline is poorly developed because the route crosses the eastern part of the Kara-Kum Desert and, between Chardzhou and Kagan, the southwestern corner of the Kyzyl-Kum Desert. Parts of these deserts are watered by the northward-flowing Tedzhen, Murgab and Amu-Dar'ya Rivers, which cross the railroad at right angles at the oasis cities of Tedzhen, Mary, and Chardzhou. These cities are the only important road centers within the corridor.

The road network consists of a number of improved dirt roads, a few unimproved roads and trails, and one caravan route. These roads and trails generally begin at the urban centers and settlements which are usually located at considerable distances along the railroad. Most of the improved dirt roads are rather long and run perpendicular to the rail line, along the banks of rivers. Many are laterally interconnected by a series of west-east desert trails at various distances from the railroad. The unimproved dirt roads in the Dushak-Kagan sector of the corridor are generally quite short. Road travel parallel to the rail line is made possible by an improved dirt road between Dushak and Bayram-Ali, a distance of 200 kilometers, and by an unimproved dirt road between Chardzhou and Kagan, a distance of 112 kilometers. There are no highways or paved roads within the network, except for some of the main streets within cities.

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The natural environment exercises considerable influence on road conditions. Climatic factors, such as extreme heat, scanty rainfall, and blinding dust storms in summer and wet ground conditions in spring, can seriously handicap movement in the Kara-Kum and Kyzyl-Kum Deserts. The desert vegetation, which consists of a sparse growth of short grasses, herbs, and bushes with scattered low scrub trees ordinarily has no effect on cross-country movement. Within the oasis areas along some parts of the corridor the vegetation is tall and lush (Figure 7) and traffic is often confined to established routes. The terrain in the Dushak - Kagan section of the corridor is characterized by low, flat sandy wastes with no great surface irregularities. Although normal wheeled vehicles are usually restricted to the roads, the greater part of the sandy wastes is open to foot, animal, and tracked or tandem-drive vehicular traffic. Within the corridor the Amu-Dar'ya, Tedzhen, and Murgab Rivers, with extensive oasis areas and sand ridges and barchans along their banks, are the major obstacles to road and cross-country movement, especially in an east-west direction.

An improved dirt road parallels the railroad between Dushak and Bayram-Ali. The principal urban centers along this road are the oasis cities of Tedzhen and Mary. From Dushak to Tedzhen, a distance of 46 kilometers, the road extends along the southern side of the rail line. Eastward from Tedzhen, however, most of the road lies north of the railroad. Just west of Mary the road makes a loop to Sagar-Chaga, 6 kilometers north of the rail line. The rivers, Tedzhen and Murgab, are bridged by this road at Tedzhen and Mary (Figure 8).

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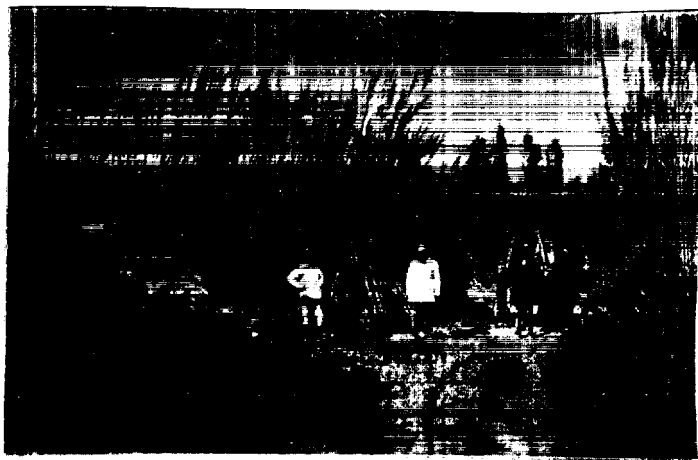
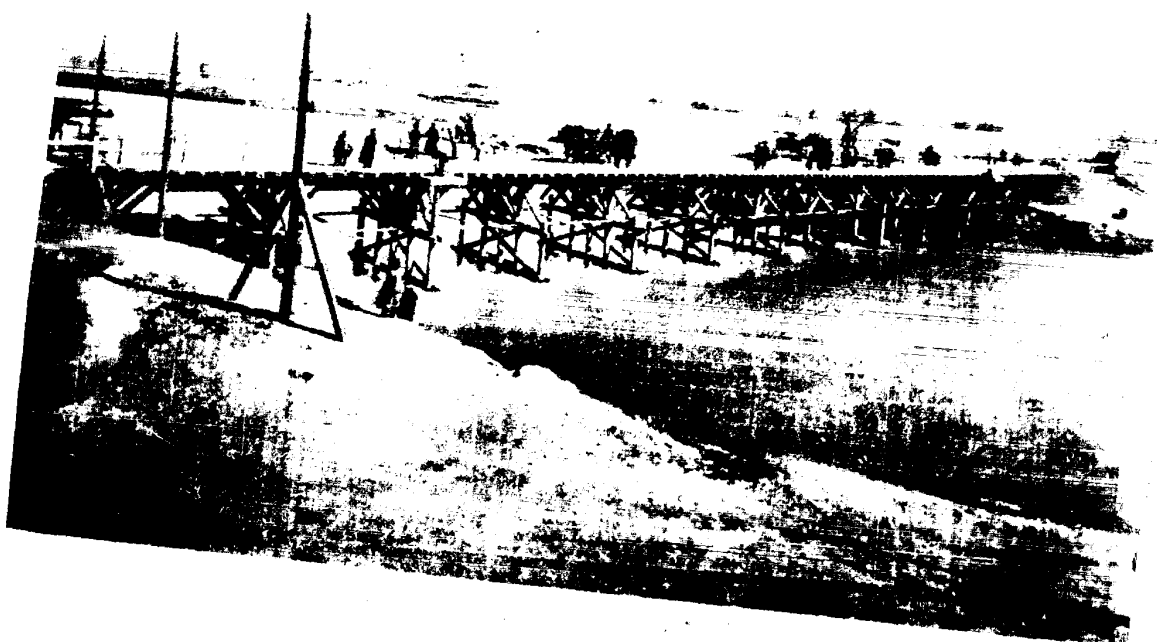


Figure 7. Tall reed growth in the Murgab Oasis near Mary

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No information is available as to the width or surface of the road, but improvements probably consist of grading or the application of a loose gravel surface, perhaps 6 to 8 meters in width. During the short muddy periods common after winter and spring rains some parts of the road may be impassable to motorized traffic. In addition, the bridges and adjacent parts of the roadway may be subject to washouts in early summer, at periods of high-water on the Tedzhen and Murgab Rivers. The road has little economic significance despite its function of connecting the irrigation-crop areas of the Tedzhen and Murgab oases.

Branching off the Dushak - Bayram-Ali road are 5 improved dirt roads to the south and one to the north. The roads to the south include two from Tedzhen and Mary and one from Bayram-Ali. At least one of these roads is of military importance. This is the Mary - Kushka road, which runs 300 kilometers upstream along the left bank of the Murgab River, parallel to the rail spur from Mary to Kushka, the settlement and border troop post on the Afghanistan frontier.

According to a recent intelligence report the Mary - Kushka road is at least partly gravel surfaced and is kept in good condition. Reasonably good driving speeds can be maintained on this road. It is used mostly by trucks.

The second improved dirt road leading south from Mary heads south-westward for approximately 136 kilometers to Herakhs, near the Iranian frontier. The improved dirt road from Bayram-Ali runs south 40 kilometers to intersect the Mary - Kushka road at Isletan⁰, an oasis center

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on the Murgab River. The longest of the two improved dirt roads leading south from Tedzhen covers a 150-kilometer distance along the eastern bank of the Tedzhen River to Serakhs. The shorter road runs south about 60 kilometers to Ineni Stalina, also near the Iranian border. The only improved dirt road branching off to the north between Dushak and Bayram-Ali is at Sagar-Chaga, 18 kilometers west of Mary. The improved portion of this road terminates at the settlement of Bol'shevik, 31 kilometers to the north. Information available concerning widths or other characteristics of these roads is not available.

There are only a few unimproved dirt roads and trails between Dushak and Bayram-Ali. The majority of these routes are confined within the oasis areas of the Tedzhen and Murgab Rivers. According to a recent intelligence source, however, an unimproved dirt road leads northeastward from Mary to Chardzhou. This road is not shown on the available Russian maps used in this study. If the report is correct the road probably parallels the Turkistan Trunkline.

The terrain within the Dushak - Bayram-Ali section of the corridor is flat to gently rolling. Outstanding terrain features in this desert lowland include low sand ridges and mounds with a general trend from north to south. These slight elevations are usually hard-packed and widely spaced and do not present a serious impediment to vehicular movement.

Within and surrounding the Tedzhen and Murgab oases, however, are dune areas of loose shifting sands which often restrict pedestrian,

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animal, and vehicular movement to established routes. The irrigated cropland within the oases also limits vehicular traffic to movement along the existing roads on the edges of the fields. Within the oases there are also dense thickets of brush, small groves of trees, and tall reeds (Figure 7) which make vehicular movement difficult off the roads. All these factors make the Tedzhen and Murgab Rivers major obstacles to cross-country movement from west to east. Both rivers originate in the high mountains along the southern border of the Turkmen Republic and disappear into the sands of the Kara-Kum Desert. The Tedzhen River has a width ranging from 25 to 50 meters and a depth from 1 to 2 meters. At Mary the Murgab River consists of a maze of channels of various widths ranging from 2 to 3 meters. The high water period of the Tedzhen and Murgab Rivers is from April to June. At this time parts of the oases become impassable because of high ground water. The low water period is in December, but often by late summer the main channels are dry. The rivers seldom, if ever, freeze.

From Bayram-Ali to Chardzhou on the Amu-Dar'ya River, the Turkistan Trunkline runs 214 kilometers northeastward across sandy wastes. Along this segment of the corridor only unimproved dirt roads, a few trails and a caravan route parallel or intersect the Turkistan Trunkline. At the rail station of Uch-Adzhi, 80 kilometers northeast of Bayram-Ali, a rail spur about 30 kilometers in length leads southeast to Chanchakly. No roads parallel this spur.

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A caravan route is probably most important to cross-country movement within the corridor. This route leads north from Bayram-Ali and then turns gradually to the northeast to the valley of the Amu-Dar'ya River. Throughout its course the caravan route parallels the railroad at distances ranging from 25 to 50 kilometers to the north.

Two of the 4 unimproved dirt roads within the corridor intersect the rail line near Bayram-Ali, and the other two near Chardzhou. One road leads south from the railroad at a point approximately 10 kilometers east of Bayram-Ali and joins the Bayram-Ali - Isolatan' improved dirt road at Turkman-Kala. The second road extends southwest from Zakimat, a settlement located approximately 25 kilometers east of Bayram-Ali, and leads to Barchat, a small settlement on the eastern edge of Murgab oasis. These roads are of local importance only but they may provide the only routes possible to vehicles within the sandy eastern extremity of the Murgab Oasis.

The first of the two unimproved dirt roads in the vicinity of Chardzhou runs in a northwest-southwestward direction across the rail line at a point 10 kilometers west of Chardzhou. The northwestern part of this road passes through the desert settlement, Inani Kalinka and then gradually joins the Chardzhou - Kungrad Railroad, which runs northwestward along the left bank of the Amu-Dar'ya River. Southeast of the Turkistan Breakline the unimproved dirt road crosses an improved dirt road leading south from Chardzhou and continues onward along the valley of the Amu-Dar'ya. The second unimproved dirt road leads west from the

railroad at a point a few kilometers south of Chardzhou and goes to Isani Kalinina. These unimproved dirt roads are of local significance only, but they do afford access through the sandy areas which ordinarily are difficult to traverse.

Between Fayz-Ali and Chardzhou, the corridor crosses sandy desert lowland consisting of comparatively small clay pans or talays interspersed among extensive areas of low sand mounds and barthans. Barthans are especially characteristic near the valley of the Amu-Dar'ya River. In many places within the barthan areas vehicular traffic is possible only on roads. The talays are shallow muddy lakes during the rainy season in late winter and spring. In early summer the water evaporates, exposing extensive muddy tracts, which are impassable to all traffic. After mid-summer, however, they provide level hard clay surfaces which are preferable to the sandy areas during the remainder of the dry season for vehicular movement (Figure 9). The sandy wastes support only a sparse vegetative growth, consisting mostly of short grasses, herbs, and bushes (Figure 10). In places small open stands of annual trees break the monotony of the landscape. On the left bank of the Amu-Dar'ya River near Chardzhou, river oases are characteristic. Here the limitations to movement are similar to those in the Tashkent and Margab oases.

From Chardzhou, a road and rail junction and river landing on the left bank of the Amu-Dar'ya, to the rail junction of Kagan, the Turkistan Trunkline trends generally northeast for a distance of 120 kilometers. The road network within this section of the corridor is sparse,

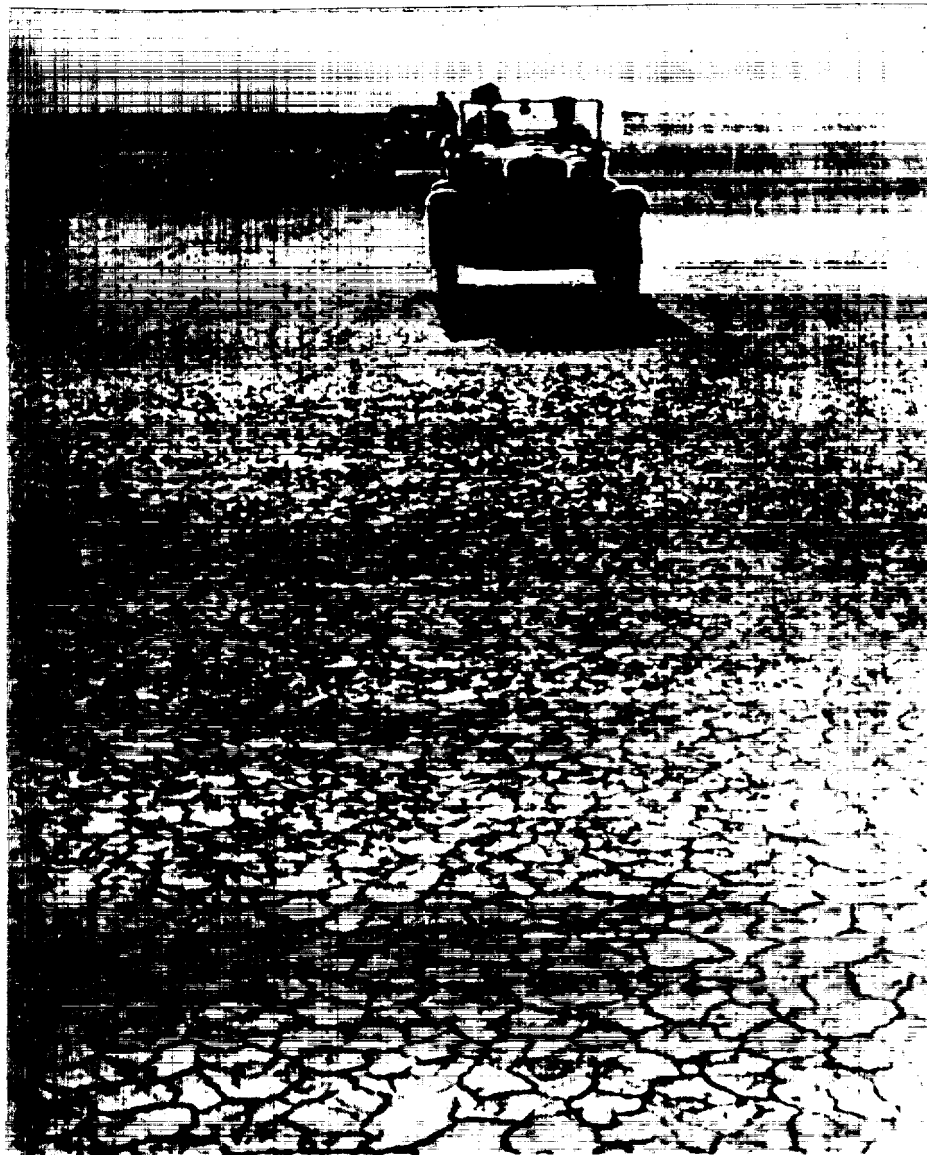


Figure 9. Cross-country movement on a Italyr

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Figure 10. Sand dunes and sparse vegetation on the flat desert floor of the Horn of Africa.



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consisting mostly of unimproved dirt roads that interconnect small settlements near the railroad. Chardzhou is the only important road center. From the Turkistan Trunkline at Chardzhou, the Chardzhou - Kungrad railroad leads northwestward along the west bank of the Amu-Dar'ya River.

The main crossroad through Chardzhou follows the meandering Amu-Dar'ya River all the way from Bassaga on the USSR-Afghanistan border to the river delta on the Aral Sea. According to an intelligence report the surface of this road consists of well packed earth and sand with a width of 8 to 10 meters. Considerable traffic is reported on this road and it is usable throughout the year.

Road travel parallel to the Turkistan Trunkline between Chardzhou and Kagan is possible over an unimproved dirt road that leads to Bukhara. Just east of Chardzhou this road crosses the Amu-Dar'ya, the largest river along the corridor, over a wooden span which probably exceeds 1,600 meters in length (Figure 11). At Chardzhou the Amu-Dar'ya is 2 to 3 miles wide and 4 to 8 meters deep. The high water period is May to July, while the low water period is November to January. Some ice forms in December and January. In places the river is composed of a series of channels which are separated by sand bars and sandy island. Narrow oases extend like ribbons along the banks. On the opposite side of the river from Chardzhou is the settlement of Farab. For a distance of 10 or 15 kilometers northeast of Farab, the unimproved dirt road runs along the

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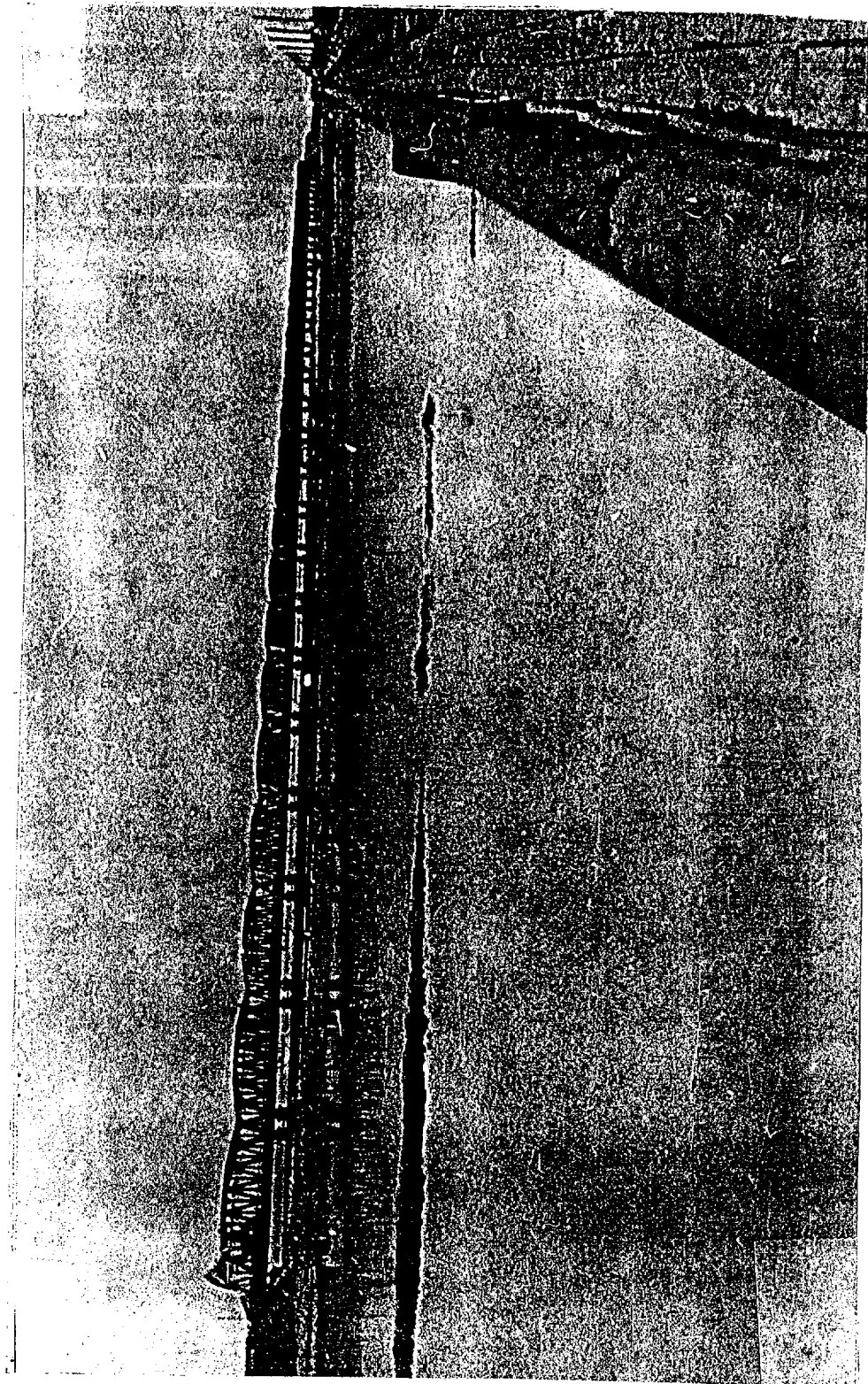


Figure 11. The Ann Dar'ya River at Chardzhou. The railroad bridge is to the left, the road bridge to the right.

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south side of the railroad. For the remainder of the distance to Bukhara the road follows the northern side of the line, and passes through the settlements of Karakul' and Khumin. Unimproved dirt roads branch off from the route at Farab, Karakul', and Khumin. The road from Farab traverses the elongated oasis that extends to the northwest along the right bank of the Amu-Dar'ya River. From Karakul', short stretches of unimproved dirt road lead to small oasis settlements on both sides of the railroad. At Khumin a short unimproved dirt road leads north to Sverdlovsk, a settlement which is connected to Bukhara by an improved dirt road.

The terrain within the Chardzhou - Kagan section of the corridor is similar to that in the Dushak - Bayram-Ali section of the corridor.

V. The Road Net from Kagan to Tashkent

The road net along the 601 kilometers of railroad between Kagan and Tashkent is comparatively dense. In general it consists of several highways and improved dirt or gravel surfaced roads (Figure 12), a multitude of unimproved and seasonal roads of local significance, and a lesser number of trails and paths. The entire course of the railroad is paralleled by a series of good roads consisting of stretches of paved highway connected by a number of improved dirt roads. These parallel roads run along the line at distances ranging from less than 1 kilometer up to 48 kilometers. The most important road in the area is a stretch of the Great Uzbek Highway (Bol'shoy Uzbekskiy Trakt) which closely parallels the entire length of line between Samarkand and Tashkent, a rail distance of approximately 353 kilometers. Major concentrations of roads in the Kagan - Tashkent section occur in the Kagan - Bukhara - Vakhkent area and near the large urban centers of Samarkand, Dzhirgatal, Ul'tat'yevskaya, Ura-Tyube, Il'ich and Tashkent.

From Kagan to Samarkand, a distance of 248 kilometers, the main roads generally follow the broad and relatively flat valley of the Zeravshan. The silty and poorly drained soils along the river hinder road travel and cross-country movement, particularly during the spring and winter periods of precipitation. Beyond Kizyl-Tape roads leading north and south from the railroad cross undulating to hilly terrain. To the north they enter the piedmont and low mountain ranges of the Bura-Tau and Ak-Tau. South of the valley is a low hill land, a western extension of the Zeravshanskiy Mountains. Roads crossing both of these



Figure 12. Improved dirt road passing through a rural settlement.

hilly regions are mostly unimproved dirt-surfaced, and are trafficable only during the dry or cold seasons. The terrain permits some movement of motorized vehicles off the roads, although occasional steep slopes and stream beds will be obstacles in places. Dust presents a critical problem to road and cross-country movement along the entire stretch from Kagan to Samarkand. Winds, often reaching up to 115 kilometers per hour, cause severe dust storms that can completely stop movement for one to three days.

A major improved road runs parallel to the stretch of railroad between Kagan and Samarkand. Throughout most of its length the road lies north of the line, except for a short distance west of Samarkand where it skirts the railroad on the south. The part of the road between Kagan and Kizyl-Tape runs initially northwestward to the oblast center of Bukhara (Figure 13) and then turns northeastward to the road junction of Vahkent and Gishduvan. This section of road, which is paved as far as Gishduvan, is probably the most important traffic artery of the Bukhara oasis. At Bukhara it connects with a paved highway and an unimproved dirt road which enter the city from the west. The road crosses the shallow Zeravshan River near Vahkent and Gishduvan. Here the river is from 100 to 200 meters across and from 1 to 3 meters deep. During the high water period in July roads adjacent to the river are occasionally inundated. Movement of vehicles off the roads is impeded by the dense riverine vegetation and extensive irrigation systems. From Gishduvan the road turns southeastward to Kizyl-Tape. Between Kizyl-Tape and Samarkand the

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1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

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road parallels the railroad fairly closely, with a maximum divergence of about 10 kilometers at Chimboy. Approximately 10 kilometers west of the settlement of Katta-Kurgan an improved road branches off the main road and provides an alternate route to Samarkand. This dirt- or gravel-surfaced road leads northeastward, crosses the Kara-Dar'ya channel of the Zeravshan and continues to Kara-Dar'ya. From Kara-Dar'ya it follows the south bank of the Ai-Dar'ya channel of the Zeravshan River. Travel is confined to the road in this area. Movement off the road is impeded by dense growths of reeds, thorn bushes, tamarisk shrubs, and jungle-like stands of trees.

Between Kagan and Samarkand several other improved roads branch off the main road. From Kagan two stretches of improved dirt road lead northward generally parallel to the railroad. The two roads converge and continue along the railroad as an unimproved road to the village of Zarnitik. From here a poor road leads to the Kur Mazar (Kuyu-Mazar) railroad station.

Several improved dirt roads branch from the paved section of the Kagan - Samarkand road and connect the settlements of Gala-Assiya, Vahkent, and Gashkhan with the irrigated farming settlements in the Bukhara Canal. At the village of Shafrikan two of these roads connect with an unimproved dirt road that runs through a desert of sand plains, dunes, and depressions to the Amu-Dar'ya near Darganate. In this terrain movement by vehicle is usually restricted to the road, whereas travel off the road on foot or animal is possible though difficult.

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The major transportation route across the Kyzyl-Kum Desert is an improved dirt road which starts at the Kermine railroad station and extends northwest to 'Turtkul' on the Am-Dar'ya. It crosses a generally flat sandy expanse which is interrupted in places by hillocks, ridges, salt marshes and depressions. Vegetation along the route is very sparse and scattered, and consists of low growths of herbs and grasses, scattered bushes, and occasional stands of saunal trees. The areas of dunes and sand ridges are devoid of vegetation. Hot, dry summers with temperatures as high as 110°F reduce daytime travel to a minimum.

The stretch of improved road which intersects the railroad at Miasit continues as an unimproved road to Karmap, a road center located about 25 kilometers south of the line.

From Dabuta an improved dirt road leads southwestward to join a gravel road which connects Samarkand to the oblast and rail center of Karshi. The gravel road traverses undulating to hilly terrain in which occasional steep slopes and streams make vehicular movement slow and difficult.

Numerous unimproved dirt roads and occasional trails on both sides of the railroad supplement the network of improved roads. At an average distance of 25 kilometers to the north of the railroad, a seasonal road parallels most of the route from Kagan to Samarkand. Following the river valleys of the Zaravshan and Ak-Dar'ya, the road passes through many small settlements such as Kerminekh, Kyzyl-Okt'yabr', and Mitan. At Pay-Aryk it connects with a paved highway leading south to Samarkand. The road is

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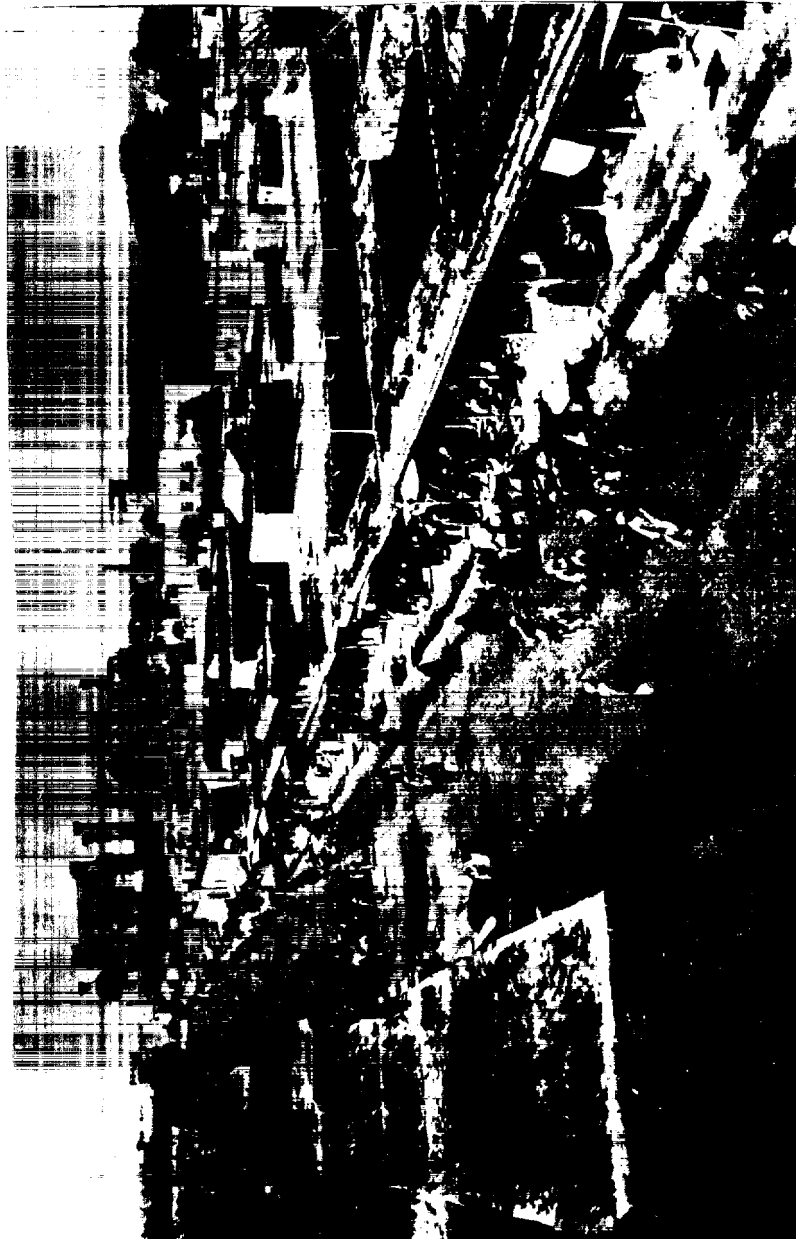
intersected by a great number of unimproved roads which generally run in a northeasterly direction to villages scattered throughout the foothills of the Mura-Iau.

The seasonal roads and trails that lead south from the railroad converge on the larger nearby villages such as Karnap, Tyn and Ulus. Although seasonal in character, the road connecting Kagan with the oblast center of Karshi is of considerable importance. Initially, it runs east of the Kagan - Karshi railroad. At Karaul-Bazar the road crosses the rail line and then follows the intermittent Kashkadar'ya River.

Directly south of Kagan the road crosses a swamp area with a dense reed growth. During the rains in spring and late fall mud conditions bring vehicular traffic to an almost complete standstill. Beyond the swamp the road passes through an area of sandy desert with migrating sand dunes and sparse vegetation. Near Karshi the grass cover increases and wormwood and scrub brush are also found. The firm surface will permit cross-country movement on foot, by pack animal, or motorized vehicle.

Samarkand, located at the eastern end of the Zeravshan Oasis, is one of the major road and marketing centers along the Krasnovodsk - Tashkent - Alma-Ata corridor (Figure 14). Several primary roads radiate from the city. A paved highway leads northward to Pay-Aryk, where it connects with a network of dirt roads that serve the numerous nearby villages of the Zeravshan Oasis. The improved road from Kagan enters the city from the northwest. A stretch of gravelled road leads north-eastward to Gazara. Samarkand is also connected with Karshi by an

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Improved road that runs to the southwest. The first 21 kilometers are paved but the remainder of the road is gravel-surfaced. A paved highway runs east-southeast from Samarkand and follows the Zeravshan Valley for approximately 140 kilometers to the intersection with the strategic Tashkent - Stalinabad - Kirovabad Highway. Samarkand is the point at which the Great Uzbek Highway (Bol'shoy Uzbekskiy Trakt) intersects the corridor.

This major land route connects Samarkand with other industrial centers of the Uzbek SSR to the northeast -- Tashkent and Makhizak. It also provides the best trade and military supply route southward to Termez on the Afghan border. The highway has a good earth foundation and is paved throughout. The surface varies in different areas, being partly asphalt or asphalt-concrete, and partly crushed rock or cobblestone (Figure 15). The width averages 10 meters and the alignment is relatively straight. Freight traffic on the road is relatively heavy, consisting chiefly of coal and industrial products. Regular daily bus service operates between Samarkand and Tashkent.

Road travel on the highway and cross-country movement off the road are influenced by repeatedly changing terrain conditions along the route. South of Samarkand the highway crosses a series of low foothills and cuts through the western extension of the Zeravshanskiy Mountains over the Takhta Karacha Pass (elevation, 1,164 meters). In this mountainous area, it will probably be necessary to move along the roadway except where a few established trails run close to the road. From Samarkand to Tashkent the Great Uzbek Highway closely follows the railroad. The highway crosses

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Figure 15. Asphalted section of the Great Wall Highway

The Kunirashan River over a 250-meter long bridge at a point where river depths range from 1 to 3 meters. Beyond the Kunirashan the route leads over a broad saddle with an elevation of 375 meters. The marshy to rolling terrain in this area is only slightly dissected and is generally favorable to movement off the road. Between the main ridge of the Khorbat Itara-Tor and the Turkistanaskiy Khorbat the highway passes through the Jannar River Valley, which is also referred to as the "Tamerlane Gateway." This valley is the main northeast-southwest traffic route in Soviet Central Asia.

Emerging from the "Tamerlane Gateway" at Dabirak the highway continues eastward to Ust'-Yevkaya, running between the Golodnaya Steppe to the north and the Turkistanaskiy Khorbat to the south. The Golodnaya Steppe is a sizeable plain with a gentle downward slope to the north and north-west where it merges with the Kyzyl-Kum Desert. The surface is composed of wind-blown deposits of sand and silt. There are only minor differences in the terrain which consists of shallow inclosed sinks and low, flat, hard-packed divides. Tracts of pure sand also occur. Vegetation is sparse and consists mainly of short grasses, scrub brush, and scattered stands of low trees. The area is traversable either on foot or by vehicle. The end of the Turkistanaskiy Khorbat lies considerably south of the road, but the lower slopes extend almost as far north as the highway. The mountains rise toward the east with elevations there ranging from 3,400 to 5,000 meters. In many cases the mountains consist of relatively isolated ridges and massifs separated from each other by deep river

gorges. There are also wide, relatively level, intermontane uplands, such as the one south of Ura-Tube. The road net south of the highway is generally restricted to the lower mountain slopes. Crossing the main ranges is extremely difficult. Of the 20 reported mountain passes, only a few are passable with any degree of ease (e.g., Peratal, Shakhristan with an elevation of 3,391 meters). Most of the passes are narrow and precipitous and the existing trails can be followed only by foot.

From Uraat'yevskaya the highway turns northward across the southeastern extremity of the Golodnaya Steppe and through a heavily irrigated area of the Syr-Dar'ya lowland to the rail junction of Syr-Dar'inakiy. East of the road the lowland consists of the present flood plain with an ancient terrace 5 to 10 meters above the present flood plain. Extensive areas on the terrace are occupied by elongated swampy depressions. These depressions range from 2 to 5 kilometers in length. The flood plain of the Syr-Dar'ya is covered with solonchak meadows, sandy mounds, and in some places barren solonchaks. Riverine vegetation consists mainly of reeds, individual poplar trees, and spiny thickets of the Siberian salt tree. A maze of irrigation ditches and canals crisscrosses the lowland area on both sides of the road. One of the main irrigation canals, "Kanal Imeni Kirova," intersects the highway about 3 kilometers north of Mirzachul'. Throughout the irrigated area, cross-country movement on foot or animal is relatively simple, but movement by vehicle is usually restricted to established roads. Most of the dirt roads branching off the highway, particularly those leading eastward toward the river, are inundated during the high water period in June.

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Approximately 10 kilometers northeast of Syr-Dar'inskii, the Great Uzbek Highway crosses the Syr-Dar'ya near its confluence with the Chirchik. Prisoner-of-war reports estimate the length of the road bridge to be 600 to 800 meters. The Turkestan Trunkline crosses the Syr-Dar'ya about 3 1/2 kilometers further downstream. The width of the river at this point is 275 meters, and the depth 3 to 6 meters. Along the remainder of the route to Tashkent both highway and railroad follow the northern bank of the Chirchik River. The Chirchik is 50 to 100 meters wide and has an average depth of 2 1/2 meters. Its high water period occurs in May and June while the low water period extends from December to February. Although the river rarely freezes over, there is some floating ice from November to March. A swamp area which is difficult to traverse extends south of the river. Only one seasonal road, branching off the Uzbek Highway at Kirda, leads through this area.

Between Samarkand and Tashkent several good motor roads branch from the Great Uzbek Highway. The paved highway that leads east-southeastward from Samarkand follows the Zeravshan River Valley for about 140 kilometers to Zhetysay. Here it meets the strategic motor road which connects Tashkent with Stalinabad and with the Afghan border town of Kirovabad. Travel along most of the Zeravshan River is generally limited to the narrow river valley by the Turkestanskiy Khrebet on the north and the Zeravshanskiy Khrebet to the south. The few trails branching from the road generally lead northward across the Turkestanskiy Khrebet.

Approximately 8 kilometers northeast of Samarkand an improved dirt road branches east from the highway to the settlements of Dzhambay and Kildon. At Krasnovodsk, 26 kilometers east of Samarkand, improved

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roads extend westward to Gazara and south-southwestward to Ak-Tapa Hill. Throughout the area between Samarkand and Krasnogwardy, movement of vehicles off the roads is impeded by extensive irrigation systems.

The Dzhizak railroad station is connected by an improved road to the city of Dzhizak, an important road and industrial center approximately 7 kilometers to the north. From Dzhizak an improved dirt road leads northeastward, crosses the Golodnaya Steppe, and continues to Slavyanka. The terrain of the Golodnaya Steppe is suitable for both pedestrian and vehicular movement off the road. At Slavyanka the road connects with an improved road that runs eastward to the Uzbek Highway, and with a paved road that leads north across a part of the Syr-Dar'ya lowland to Il'ich. Il'ich is the center of the densely irrigated Pakhta-Aral cotton plantation and much of the cotton that is produced probably is shipped to Samarkand over the Slavyanka - Dzhizak route. Il'ich is connected by a railroad and an improved road to Syr-Dar'inakiy, a settlement on the Turkistan Trunkline approximately 13 kilometers to the east. The Slavyanka -- Il'ich road continues northwestward beyond Il'ich to Chardara on the Syr-Dar'ya River.

Approximately 5 kilometers east of the Dzhizak railroad station an improved road from Dzhizak intersects both the Uzbek Highway and the Turkistan Trunkline. Initially, the road leads southeast to the vicinity of Panagar where it runs to the east, crosses the lower slopes of the Turkestan'skiy Khrebet, and eventually meets the road between Uraat'yevskaya and Ura-Tyube. The undulating to hilly terrain is generally favorable for

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cross-country movement either on foot or by animal, but vehicular traffic is limited to certain localities or directions and in many places is confined to the established roads.

Tashkent is the terminus of a strategic road which leads south to Stalinabad and then continues to the Afghan border at Kirovabad. It is the major highway of the Tadzhik SSR. The road surface is paved, except for the part of the road between Pakent and Ura-Tyube which is gravel or improved dirt. South of Tashkent the road crosses the Chirchik and Angren Rivers, skirts the western slopes of the Kuraminskiy Khrebet, and crosses the Syr-Dar'ya to Leninabad. The bridge over the Syr-Dar'ya is approximately 200 meters long and 8 meters wide. From Leninabad the road leads southeastward through Ura-Tyube and the Shakhristan pass and continues southward across rugged mountainous terrain to Stalinabad.

A second paved highway leads northeastward from Tashkent along the Chirchik River Valley to Iskander, closely paralleling the Tashkent - Iskander railroad line. Freight traffic is reported to be comparatively heavy along most parts of this road.

Numerous unimproved and seasonal dirt roads radiate to the north and south of the Samarkand - Tashkent section of the route. North of the Turkestan Trunkline many of the roads that fan out from the vicinity of Dzhizak lead northeastward across the Golodnaya Steppe to the Syr-Dar'ya flood plain. In the cultivated areas of the steppe they frequently bridge modern irrigation canals (Figure 16). Other roads extend into the northern and southern foothills of the Khrebet Kura-Tau. Between Dzhizak and Urat'yevskaya stretches of seasonal roads closely parallel both sides of the railroad. Most of the roads to the south from the railroad are

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Figure 16. Concrete bridge over the railroad canal in the vicinity of...

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restricted to the lower slopes of the rugged Turkistan'skiy Kirebet. Zamin, Yam-Dahan, and Shakhristan are the foci of many of these roads. Vehicular movement over these roads is limited to the dry or cold seasons. Between Ursat'yevskaya and Syr-Dar'inskly a relatively dense network of seasonal roads extends throughout the irrigated portion of the Syr-Dar'ya lowland. Many of these roads, however, are flooded during the high water period. From the Syr-Dar'ya eastward to Tashkent seasonal roads tend to be localized to the area north of the railroad where they generally follow the valleys of the small tributaries of the Syr-Dar'ya. On the southern side of the railroad an extensive area of swamp is located between the Chirchik and Angren Rivers.

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VI. The Road Net from Tashkent to Alma-Ata

The rail distance between Tashkent and Alma-Ata is 990 kilometers. From Tashkent the railroad runs in a north-northwestward direction for 155 kilometers to the rail junction of Arys'. At Arys' the rail route leaves the Tashkent - Chkalov line, which continues along the Syr-Dar'ya River to European Russia, and follows a generally east-northeast direction the remainder of the route to Alma-Ata. The terrain in this section is a complex combination of piedmont plains, foothills, low mountains, river valleys and smaller areas of sandy and salt-marsh plains. In most instances movement off the roads is handicapped by mountainous terrain to the south and deserts to the north. Winter snow, dust storms and extreme summer and winter temperatures may also hinder movement.

The road net between Tashkent and Alma-Ata consists of a few short stretches of paved highway, a series of improved dirt roads and a dense network of unimproved roads and trails. The principal motor route paralleling the rail line is the Tashkent - Alma-Ata road which follows a course along the northwestern and northern foreland or piedmont of the great Tien Shan Mountains. The density of the road net varies considerably along the different parts of the route. North of the railroad the densest net is found between Arys' and Dzhanbul; south of the line the sector between the rail junction of Lugovaya and Otar has the densest network of roads. There are major concentrations of highways, improved dirt roads, and a large number of the unimproved dirt roads radiating from the principal rail junctions and urban centers along the rail line - Arys',

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Chimkent, Dzharbent, Lagovaya, Chu and Alma-Ata. In addition, a number of unimproved roads and trails extend from the minor rail stations to small settlements north and south of the route.

Roads between Tashkent and Arys' consist of one improved dirt road which crosses the railroad at Saryagash, approximately 20 kilometers north of Tashkent, and a number of unimproved dirt roads and trails which parallel and intersect the rail route. The improved dirt road originates at Abay-Bazar, 23 kilometers west of the rail line, and runs about 18 kilometers east of Saryagash where it intersects the portion of the Tashkent - Alma-Ata Road which leads to Chimkent. The Tashkent - Chimkent road is an improved dirt road with a length of about 114 kilometers. From Tashkent this road runs northward about 31 kilometers to the Keles River. It continues upstream along the western bank of the river, crosses a narrow ridge, and then descends on the other side along a valley of a tributary of the Arys' River to Chimkent. Most of the roads and trails on the eastern side of the railroad intersect the Tashkent - Alma-Ata Road.

Several unimproved dirt roads radiate from Arys' at the junction of the Tashkent - Chkalov and Turk-Sib (Turkestan-Siberian) Railroads. Only two unimproved dirt roads are found along the relatively short rail stretch between Arys' and Chimkent, 79 kilometers to the east. One of these roads parallels the rail line to the north, and connects Arys' with Chimkent. The second road begins at the Tashkent - Chkalov railroad, runs northeasterly crossing the Turk-Sib at I-ye Mayu (1st of May), and continues to Chibarovka.

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Numerous roads intersect at the oblast center of Chirchik. The Tashkent - Alma-Ata road enters the city from the southwest and then continues northeastward parallel to the railroad. An improved dirt road leads northwestward from Chirchik to Turkestan on the Tashkent - Alma-Ata railroad. The remainder of the road net consists primarily of north-south unimproved dirt roads. A rail spur extends 29 kilometers from Chirchik southeastward to the coal mines at Lenger.

East of Chirchik the Tashkent - Alma-Ata Road is paved as far as Vannovka, a distance of about 72 kilometers. Along this segment of the route the highway and railroad intersect about 18 and 58 kilometers (near Sas-Tyube) east of Chirchik. The corridor crosses several streams which descend from the Uganskiy Range to the south. From the rail stations of Sergayevka and Sas-Tyube unimproved dirt roads run northward to small agricultural settlements situated mainly in stream valleys in the western foothills of the Kara-Tau Mountains. Similar roads lead to settlements south of the line.

Beyond Vannovka the Tashkent - Alma-Ata Road runs through a broad pass (elevation, 1,179 meters) between the Kara-Tau and Talaskiy Ala-Tau Mountains to the south, and descends to Dzhambul in the Talass River Valley. The road lies north of the Turk-Sib and numerous unimproved dirt roads branch off to the north along this part of the route. Most roads follow the general northwest-southeast alignment of the Kara-Tau Mountains. During the winter the roads leading into the mountains may be blocked by heavy snowfalls and slides. From Burno-Okt'yabr'skoye an unimproved dirt road leads to the southeast, crosses the rail line near H. Pokrovka, and

continues to Groznoye, 7 kilometers south of the Turk-Sib. From Groznoye, several unimproved dirt roads lead to scattered villages south of Dzhambul.

A paved highway approximately 32 kilometers in length leads from Dzhambul southeasterly along the course of the Talass River and terminates at Kirovskoye. An improved dirt road follows the meandering course of the Talass River eastward for a distance of approximately 124 kilometers from Kirovskoye to Kupre via the oblast capital of Talass. Few roads radiate from Kupre, a small village located on the southern slopes of the Kirgizskiy Range in the upper reaches of the Talass Valley. A trail leads northward across the Kirgizskiy Mountains to the Turk-Sib rail junction of Ingovaya.

In the vicinity of Dzhambul the width of the Talass River varies from 30 to 50 meters, and its depth from 1 to 2 meters. The low water period is from February to April, the high water period in July and August. Its banks are rocky and steep. The river contains some ice from December to February, but only rarely freezes over. Vegetation along the Talass consists of reeds, thorn bushes, dense thickets of tamarisk and scattered stands of willow and poplar trees. Feather grass meadows are also found in the valley. Feather grass, which reaches heights up to 1 1/2 meters, forms a firm turf.

Most of the roads radiating northward from Dzhambul follow the general alignment of distributary stream channels of the Talass River. These roads connect small agricultural settlements in the area. A spur line of the

railroad runs west-northwestward from Dzhambul to the phosphate works at Chilik-Say on the eastern slopes of the Kara-Tau Range. It is approximately 30 kilometers in length. Two improved dirt roads also starting at Dzhambul run northwestward to Aktau. The first crosses the spur line at Kichuk. The second is east of the line for its entire length. A third improved dirt road fans out into several unimproved dirt roads 35 kilometers north of Dzhambul.

At Dzhambul, the Talass River turns northeastward toward Bulannovka. A paved highway, 24 kilometers in length follows its eastern bank to Bulannovka where it crosses the river and intersects an improved dirt road originating at Irani Chapayeva, 6 kilometers south of the Turk-Sib. Additional routes leading northward from Dzhambul consist only of short unimproved dirt roads. Terrain conditions do not present any unusual road difficulties; however, rains with occasional cloudbursts during the spring and winter make most of the roads impassable for vehicular traffic.

The Tashkent - Almaty road from Dzhambul eastward follows the Turk-Sib to the rail junction of Lugovaya. From Lugovaya it continues along the Lugovaya - Rysach'ye branch line to Frunze. Throughout this part of the route the road is on the northern piedmont of the high Kirgizskiy Mountains. For approximately one-half of the distance to Lugovaya the road lies to the north of the rail line. Near Aktyotke the road crosses the Turk-Sib and continues south of the line to Lugovoy. A short unimproved dirt road connects Lugovoy to the rail junction of Lugovaya, about 7 kilometers to the northeast. Between Dzhambul and Lugovaya several alternate roads of unimproved dirt parallel the line.

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The Turk-Sib railroad from Lugovaya to Chu, 116 kilometers to the northeast, is paralleled on the north by an unimproved dirt road. Both railroad and road closely follow the alignment of the Kuragaty River to within 24 kilometers of Chu where the river swings northward. Numerous small streams flowing northward intersect the Kuragaty River along this segment of the route. Reeds and sedges, and some trees are found along the river. To the north in the Mugum-Kum sagebrush and scattered low growths of herbs and grasses predominate. The only roads intersecting the line from the north are two unimproved dirt roads which originate at the rail station of Akyrtoke to the west.

One of the densest networks of dirt roads along the entire Tashkent - Alma-Ata route is found in the highly cultivated Chu Valley south of the Turk-Sib between Lugovaya and Otar, 271 kilometers to the east. Many of the roads in the Chu Valley radiate from rail stations and settlements adjacent to the rail line. From Chu on the Chu River an improved dirt or gravel surfaced road follows the course of the Chu River south-eastward through a number of settlements. At the large settlement of Georgiyevka the road joins the Frunze - Alma-Ata road which crosses the Chu River, and continues southward for some 20 kilometers to Frunze. A large number of unimproved dirt roads branch off this important road and lead to neighboring sovkhoses, kolkhozes, and rural villages. Most of the unimproved roads are muddy during the wet season and during intensive dry summer heat they become blanketed with a deep cover of dust.

The Chu River is not a serious obstacle to cross-country movement on foot, but it does channelize roads in the area. It is 50 meters wide

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with a depth of 1 to 3 meters. Its banks are low, flat and sandy. There are many shallow spots and the river is reported fordable at many places. The high water period is from June to August, the low water period December through April. Floods are common but not extensive. The river often freezes over from December to February. Vegetation along the Chu is similar to that found in the Talass Valley.

Two rail lines and several roads lead northward from the rail line between Chu and Otar. A narrow gauge spur line runs northwestward from Chu for approximately 140 kilometers to the mining settlement of Stodvadtsat' Chetvertyy Kvartal in the sandy Muyun-Kum Desert. The junction of the Turk-Sib and the Mointy-Chu railroads is located about 13 kilometers northeast of Chu. An improved dirt road, passing through Novo-Troitskoye, connects Chu to Espe, 42 kilometers to the northeast. One of the several roads running northward from the line between Chu and Otar, originates in the vicinity of Espe. It is an improved dirt road which follows the western foothills of the Chu-Iliyskiye Mountains. The road lies to the east of the Mointy-Chu railroad. An unimproved dirt road originating at Chu follows the general course of the Chu River northwestward into the desert.

The important Frunze - Alma-Ata road between Otar and Alma-Ata, 156 kilometers to the east, comprises the eastern section of the Tashkent - Alma-Ata highway and parallels the Turk-Sib railroad from 17 to $\frac{3}{4}$ kilometers to the south. The road, 237 kilometers long, is an important military road and the shortest motor route between Frunze and Alma-Ata. From Otar to Alma-Ata the road skirts the foothills of the Chu-Iliyskiye

and Zailiyskiy Ala-Tau Mountains and excess numerous streams which originate in the Zailiyskiy Ala-Tau to the north. The surface of the road is gravel except for a short 25 kilometer stretch between Tashkelen and Alma-Ata which is paved with stone. Along this section of the route the road passes over two bridges. According to available sources, one of the bridges located 5 miles west of Alma-Ata can be bypassed, since trucks can easily ford the stream about 32 feet north of the bridge by crossing on an artificially built, underwater gravel causeway. The width of the road and bridge is 7 meters. Traffic along the entire route consists mainly of trucks.

Near Yeshkili-Kurday a 21-kilometer improved dirt road links Otar with the Frunze - Alma-Ata road. Along its route from Yeshkili-Kurday to Frunze, the Frunze - Alma-Ata road crosses the Chu-Iliyskiy Range via the Chigay Pass (elevation, 1,224 meters) through Syugaty and Georgiyevka. The road crosses the Chu River at Georgiyevka.

In the vicinity of Alma-Ata improved dirt roads join both Kaskelen and Uzun-Agach with Kol'-Ashchi near the rail line. Another improved dirt road from Kol'-Ashchi passes through Kurunday to Alma-Ata. Elevations at Alma-Ata range between 700 and 800 meters. At the base of the Zailiyskiy Ala-Tau they increase to 900 to 1200 meters. In the vicinity of Alma-Ata snow cover with depths exceeding 6 inches during most of January and February is a major obstacle to movement. Other north-south routes intersecting the Frunze - Alma-Ata road and the rail line consist of only several unimproved dirt roads.

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From Alma-Ata, a highway extends eastward, across numerous northward flowing streams from the Zailiyskiy Ala-Tau, to Chilik and then southward to Egen'. The road is 6 meters wide and has an asphalt surface except between Talgar and Chilik, 35 kilometers and approximately 100 kilometers east of Alma-Ata, respectively, where it is of improved dirt or gravel surfaced. About 18 kilometers east of Alma-Ata the highway narrows for a short distance to less than 3 meters. An alternate road of improved dirt parallels the highway to the north from Alma-Ata to Yevgen'yevka where it intersects the highway. An improved or gravel surfaced road connecting Alma-Ata with Ili on the Ili River, approximately 75 kilometers to the north-northeast, skirts the Turk-Sib railroad at a distance of 1 to 2 kilometers. Beyond the city limits of Alma-Ata the surface of the road consists of rolled crushed stone and is approximately 6 meters wide. About 21 kilometers north of Alma-Ata and within 6 kilometers of Ili, the road crosses the rail line. Traffic is heaviest in the section leading from Alma-Ata to the airfields north of the city. To the south of Alma-Ata an improved dirt road extends for about 21 kilometers to the settlement of Alma-Arasan (elevation, 2,200 meters) located in the Zailiyskiy Ala-Tau Mountains (Figure 17).

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Figure 17. An improved close-up photograph of the rock fragment from the rock fragment. The fragment is a dark, irregularly shaped object, possibly a rock or a piece of debris, resting on a light-colored, textured surface. The fragment is positioned in the center-left of the frame. To the right of the fragment, there is a series of vertical, parallel lines, possibly a fence or a wall, extending from the bottom towards the top of the image. The overall image is very grainy and has a high level of contrast, with deep blacks and bright whites.

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VII. Analyst's Note

The reliability of the information given in this report on terrain, vegetation, climate, and hydrography ranges from poor to good. The lack of adequate large-scale physical maps precludes a detailed and accurate description of terrain. Textual materials and maps were available for a fairly reliable analysis of vegetation in regard to its effect on trafficability and cross-country movement. The climatic information is generally reliable, but hydrographic data are incomplete, especially on the smaller rivers.

The data on road classification used in this study are fairly accurate and reliable. The map information of trafficability is essentially correct, but within the generalized categories the local exceptions could not be shown. The map of the road net along the rail route was compiled from medium and small-scale pre-war and post-war Soviet maps. However, the coverage was inadequate in some areas, especially in the western half of the corridor. No large-scale post-war maps are available and aerial photographic coverage is limited to the urban area of Krasnovodsk.

The general deficiency in documentary and textual sources on the locations and description of road bridges and the width, type, condition, and traffic of individual roads is considered a major limitation to a detailed and complete description of the road network covered by this report.

VIII. Map Coverage

1. Uzbekskaya SSR; Administrativnaya Karta Samarkandskaya Oblast'
(Uzbek SSR; Administrative Map of Samarkand Oblast), 1:350,000, Glavnoye Upravleniye Geodezii i Kartografii Pri SNK SSSR (Chief Administration of Geodesy and Cartography of the Council of Peoples Commissars, USSR), 1940.
2. Uzbekskaya SSR; Administrativnaya Karta Tashkentskaya Oblast'
(Uzbek SSR; Administrative Map of Tashkent Oblast), 1:350,000, Glavnoye Upravleniye Geodezii i Kartografii Pri SNK SSSR (Chief Administration of Geodesy and Cartography of the Councils of Peoples Commissars), 1939.
3. U.S.S.R., 1:500,000 General'nyy Shtab Krasnoy Armii (General Staff, Red Army), AMS Call No. N 3-30-57049-500: Sheets J-41-A, Chu-Adzhi, 1935; K-42-V, Mirza-Chul', 1934; K-42-B, Chimkent, 1938; K-42-G, Tashkent, 1936.
4. U.S.S.R., Captured Maps Around the Caspian Sea, 1:500,000, General'nyy Shtab Krasnoy Armii (General Staff, Red Army), AMS Call No. N 32-30-57049-V (SECRET): Set A, Sheets 6 of 8, 1943 and 8 of 8, 1946; Set B, Sheet 5 of 9, 1944; Set C, Sheets 3, 4, and 5 of 9, 1944. Availability AMS Document No. USSR 7D-24622, Group "A".
5. Kirgizskaya SSR (Kirgiz SSR), 1:1,000,000, Glavnoye Upravleniye Geodezii i Kartografii Pri Sovete Ministrov SSSR (Chief Administration of Geodesy and Cartography of the Council of Ministers, USSR), 1952.
6. Karta Uzbekskoy SSR (Map of the Uzbek SSR), 1:1,500,000, Narodnyy Komissariat Vnutrennikh Del, Glavnoye Upravleniye Gosudarstvennoy Sluzhby i Kartografii SSSR (Peoples Commissariat of Internal Affairs USSR, Chief Administration of State Survey and Cartography), 1938.

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Figure 12. Improved dirt road in rural settlement.
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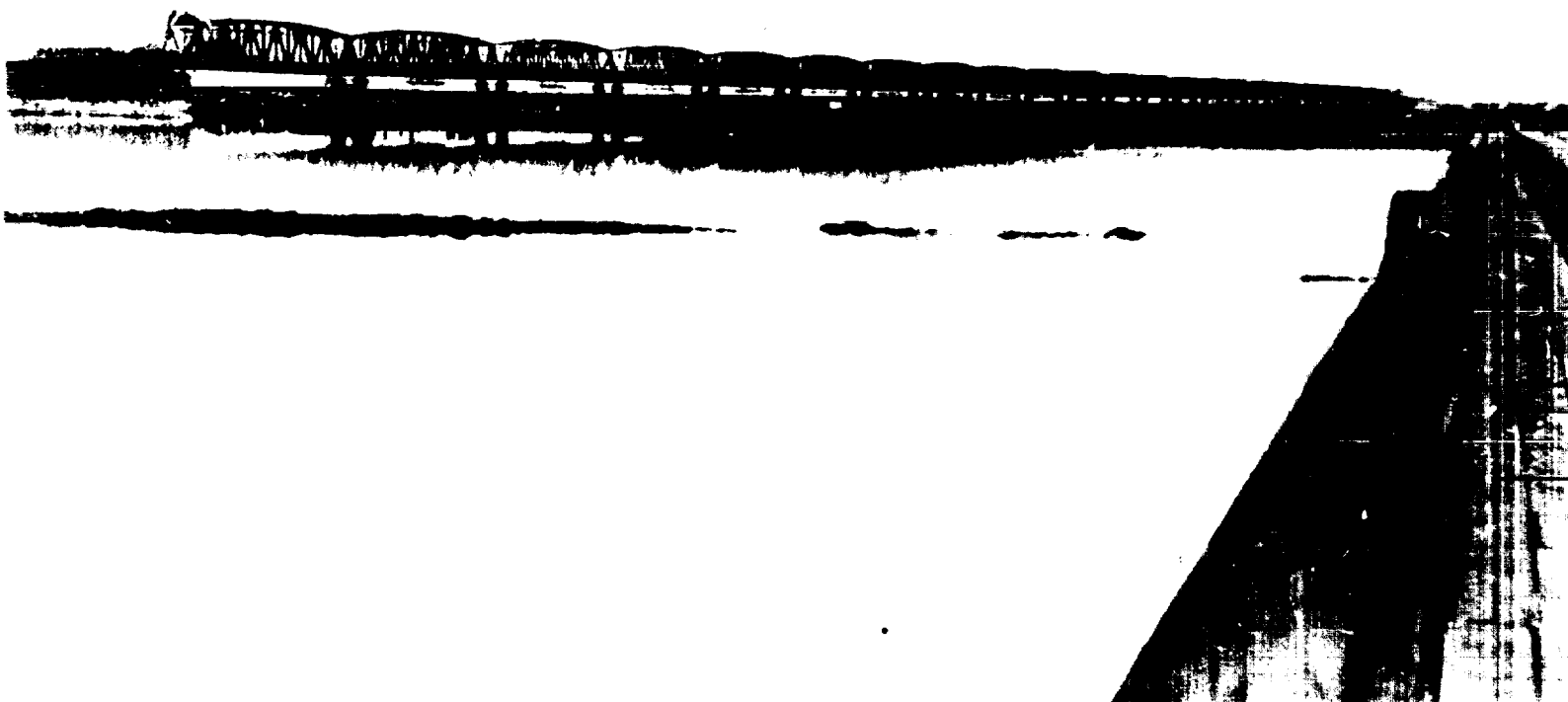
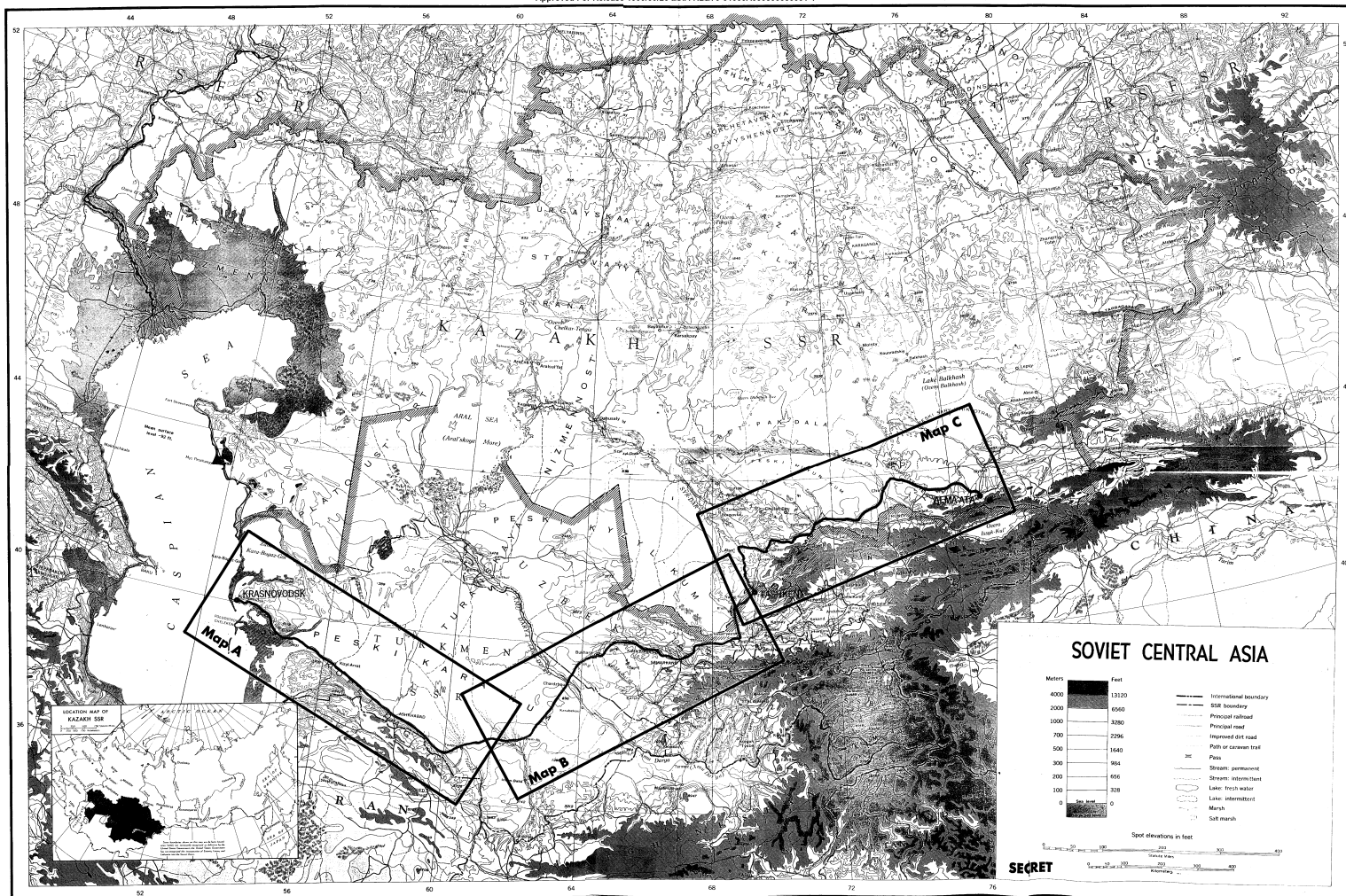


Figure 11. The Amu Dar'ya River at Chardzhou. The railroad bridge is to the left, the road bridge to the right.

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